

We claim:

1. A process which comprises reacting hydrogen and oxygen in a solvent in the presence of a catalyst comprising a polymer-encapsulated transition metal to produce hydrogen peroxide.
2. The process of claim 1 wherein the transition metal is one or more metals selected from Groups 7 to 11.
3. The process of claim 2 wherein the transition metal is selected from the group consisting of Fe, Co, Ni, Pd, Pt, Ru, Rh, Re, Au, and mixtures thereof.
4. The process of claim 3 wherein the transition metal is Pd.
5. The process of claim 3 wherein the transition metal is selected from the group consisting of Pd-Pt mixtures and Pd-Au mixtures.
6. The process of claim 1 wherein the polymer is selected from the group consisting of polystyrenics, polyolefins, polyureas, polyacrylics, polyurethanes, polyesters, polyamides, fluorinated polymers, polysaccharides, polypeptides, polynucleotides, and mixtures thereof.
7. The process of claim 6 wherein the polymer is polystyrene.
8. The process of claim 7 wherein the polymer-encapsulated transition metal is produced by polymerizing styrene in an aqueous suspension in the presence of a transition metal source.
9. The process of claim 6 wherein the polymer is a phosphorus-functionalized polystyrenic.
10. The process of claim 1 wherein the solvent is selected from the group consisting of water, oxygenated hydrocarbons, and mixtures thereof.
11. The process of claim 1 wherein the solvent is selected from the group consisting of water, C<sub>1</sub>-C<sub>4</sub> alcohols, carbon dioxide, and mixtures thereof.
12. The process of claim 1 wherein the solvent is a mixture of methanol and water.

**13.** The process of claim **12** performed in the presence of a protic acid.

**14.** The process of claim **1** wherein the transition metal is supported prior to polymer encapsulation.

**15.** The process of claim **14** wherein the support is selected from the group consisting of silicas, aluminas, carbons, zeolites, clays, and organic polymers.

**16.** The process of claim **15** wherein the transition metal is palladium and the support is a titanium silicalite.

**17.** The process of claim **16** wherein the titanium silicalite is TS-1.

**18.** The process of claim **1** performed in the presence of a protic acid.

**19.** The process of claim **18** wherein the protic acid is hydrogen bromide.

**20.** The process of claim **18** wherein the protic acid is a mixture of hydrogen bromide and phosphoric acid.